floods which damaged the roads and caused a large landslide at Vaughans Rock near Castleton, where four or five acres of land moved downwards and partly blocked the wagwater. The high northerly winds which accompanied the rains blew down very many banana trees.

These winds and rains were produced by a large and shallow barometric depression which was then south of the east end of the island, moving leisurely westward. On the 13th it was south of the middle of the island, and the fall of the barometer at Kingston was about a tenth and a half of an inch. On the 14th its presence was felt at the Kempshot Observatory and at the Negril Point Lighthouse; and on the 15th and 16th its position south of Negril was well marked.

We must now return to Kingston. The break-up of a long-continued drought occurred on the afternoon of the 10th, with a heavy thunderstorm which lasted through the night, and rains fell during the passage of the southern depression. On the afternoon of the 14th the barometer began to rise, but between 7 a. m., and 3 p. m., the air currents at Kingston swung round to the south; this was well marked at the Weather Office, Halfway Tree, and a slight fall in the barometer showed that another depression was forming, this time in the middle of the island. But still the combined fall of the barometer was only a tenth and a half below the mean, and both the disturbances were only cases of our usual "depressions," which are so beneficial when not too strongly marked by heavy rains and stormy weather.

On the afternoon of the 15th the barometer in Kingston fell to 29.74, and the wind from the southeast rose to 20 miles an hour. At Kempshot the barometer was higher, namely 29.77 inches, with a light east wind; and this showed that the inland depression was felt more in Kingston than at Kempshot.

During these days telegraphic messages had been passing between Kingston and Kempshot, but the latter place is isolated and much time was lost; moreover, the inland depression confused the indications. These had already been confused at Kempshot by a storm or depression far away to the west or northwest.

On the 16th at 7 a. m. the barometer at Negril was 29.63, wind northeast, 12 miles an hour; at Kempshot it was 29.70, wind east, 4 miles an hour, so that up to this time there was no cause for apprehension, but at 11 a. m. it was noticed at Kempshot that the center of the Negril disturbance was turning northward and a telegram was at once sent to Kingston to warn the west end of the island. In the meantime the interior disturbance had broken the telegraphic communication in the middle of the island and the wires were still down on Sunday, the 17th, when I wished to inform Kingston that the center was then off the northwest end of the island, but the west end had received the general storm warnings from Kingston and they were posted at all the telegraph offices. Each hurricane season the public are advised to take every precaution after such warnings have been issued, for the telegraph wires may be broken, or two cyclones, or the curvature of a single cyclone in its course, may confuse the indications; all of which occurred at this time.

Referring to the map that will accompany the full report, the advancing cyclone "B" was strongly felt at Negril, but it was not until midnight of the 17th–18th that at Kempshot I became aware that there were two cyclones. Some lower clouds were moving from the southeast to cyclone A, and some were moving from the east to cyclone B, producing the wildest confusion in the sky dimly lit by moonlight.

Cyclone B arrived at St. Johns Point at 8 a. m., and from the duration of the calm at the lighthouse and its rate of motion it may be deduced that the diameter of the calm area was about 20 miles. Again, it passed centrally over Windsor Pen in Trelawny at 6 p. m., so that the center was moving at the rate of 4.7 miles per hour; and as the calm area took four hours to pass over Windsor, the diameter of the calm area was about 19 miles, which agrees very closely with the diameter found at Negril.

But while the barometer at Negril fell to 28.49, at Windsor it fell to only 29.32; so that the passage of cyclone B over the island, and also its encounter with cyclone A, had greatly reduced its intensity; so much so that on its onward course it did comparatively little damage.

Having given a general description of cyclone B we must now return to cyclone A which had greatly increased in intensity during the night of the 17th and early morning of the 18th. It wrecked the west end of the island and the town of Lucea shortly after midnight, and the center passed a little south of Great Valley in Hanover at 2.30 a. m. At midnight the wind at Great Valley blew with hurricane force from the southeast; at 5 a. m., the wind backed to the northeast with increased violence, but nothing is said about a calm in this interval, so that probably the diameter of the calm area was small.

The center of cyclone A was moving very slowly at about 3 miles an hour, and it was approaching Kempshot where the barometer slowly fell until 4.55 a. m. It was then 29.24, wind southeast, in violent gusts. Then the barometer began to rise slowly, so that the curve on its course carried the center nearest to Kempshot when the center passed over the Bogue Islands a little west of Montego Bay.

The barometer at Kempshot began to fall again at 6 a. m., to the advancing cyclone B with the wind east southeast or southeast.

Great Valley seems to have had little wind between 10 a. m., and 2 p. m., it was at first protected by its position between the two centers, and then it was in the large calm area of cyclone B. But at 2 p. m., the calm area had passed and the wind blew from the north with appalling violence.

At Kempshot, between 6 a. m. and noon, the wind veered from southeast to south-southeast and south, when it blew a hurricane until 1.20 p. m. This was due to an erratic approach of cyclone A. At 1.30 p. m., there was a lull, due to the calm area of cyclone B, but as Kempshot was on the edge of the calm area of cyclone A, the two calm areas may have united. At least there was the appearance in the sky of a calm area for many miles to the southwest, and also to the north, with patches of blue sky here and there.

The calm continued until 6 p. m., when the wind blew from the northwest with terrific force. Kempshot was then just outside the calm area, and this shows that the computed velocity of the center, its direction, and the diameter of the calm area, are as correct as possible.

I know but little of the further progress of this storm; at Windsor the wind blew with hurricane force from the southeast up to 4 p. m.; then came the calm, and afterwards at 8.05 p. m., the wind blew with hurricane force from the northwest. The steamship *Admiral Dewey* ran into it off St. Anns Bay that night, and it was finally reported to have taken the Windward Passage.

The conflict of the two cyclones from noon to 2 p. m., between Montego Bay and Kempshot will require much careful study. I have a most valuable series of notes from Cinnamon Hill, between Montego Bay and Falmouth, consisting of barometer readings and directions of the wind; but as Mr. Shore remarks, "at times it came from all sides—a strong gust from the north being followed by one from the east and south." I have not been able to use his notes in this preliminary report. It appears, however, that after cyclone B had passed eastward another cyclone (either A or C) passed westward, giving Cinnamon Hill and Kempshot northeast and east winds in squalls and gusts

JAMAICA, *December 2, 1912.*

A ST. LAWRENCE RIVER MIRAGE

[By Mr. DOUGLAS MANNING, Alexandria Bay, N. Y.]

A peculiar and interesting mirage occurs on the St. Lawrence River, and is seen during the spring and autumn months from the village of Alexandria Bay, N. Y., when cloudy skies prevail, and soon after northerly winds have set in and the weather is growing colder and "on the clear."

Looking northward from the village are several small islands, about 2 miles away, situated near the center of the river, which make a very pretty picture, covered with pine and cedar, and surrounded by the water, characteristically so blue. When such weather conditions prevail as mentioned above, these islands appear as though they were situated on a snow-covered ice field with the trees standing out in strong relief, giving the appearance of a dead calm prevailing in the immediate section. The effect is totally weird, for in reality the wind is strong and the water quite rough, for north winds blow against the river current.

The most interesting feature is that if one ascends a nearby bluff about 25 feet high, the illusion disappears entirely, and the islands, surrounded by the rough, blue waters, and the trees take on their natural look. Residents predict colder, clearing weather whenever the mirage appears, and of course it is a very good sign.

NOTE.

It will soon be proper to prepare a corrected and enlarged edition of the "Chronological Outline" published in the Monthly Weather Review in 1909, volume 37, pages 87–180. All observers and correspondents of the Weather Bureau are urgently requested to send Prof. Abbe of this bureau, such corrections, additions, and suggestions, as may be appropriate to this new edition.